ISSN 0704-3716

Canadian Translation of Fisheries and Aquatic Sciences

No. 5205

Data on seal distribution in the Greenland Sea depending on the position of the ice edge

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Original title: Dannye o raspredelenii tyulenei Grenlandskogo morya v zavisimosti ot polozheniya kromki l'da

In: Mater. Rybokhoz. Issled. Sev. Bass. 9: 67-72, 1967

Original language: Russian

Available from:

Canada Institute for Scientific and Technical Information
National Research Council
Ottawa, Ontario, Canada K1A 0S2

1986

9 typescript pages

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MULTILINGUAL SERVICES DIVISION – DIVISION DES SERVICES MULTILINGUES

TRANSLATION BUREAU BUREAU DES TRADUCTIONS

LIBRARY IDENTIFICATION – FICHE SIGNALÉTIQUE

CTFAS 5205

Translated from - Traduction de	Into - En
Russian	English

Author - Auteur

O. Ch. Mikhnevich and V.A. Potelov

Title in English or French - Titre anglais ou français

Data on Seal Distribution in the Greenland Sea Depending on the Position of the Ice Edge

Title in foreign language (Transliterate foreign characters)
Titre en langue étrangère (Transcrire en caractères romains)

Dannye o raspredelenii tyulenei Grenlandskogo morya v zavisimosti ot polozheniya kromki l'da

Reference in foreign language (Name of book or publication) in full, transliterate foreign characters.
Référence en langue étrangère (Nom du livre ou publication), au complet, transcrire en caractères romains.

Materialy ryb. khoz. issled. sev. basseina

Reference in English or French - Référence en anglais ou français

Fisheries Research Papers, Northern Basin

Publisher - Éditeur	DATE OF PUBLICATION / DATE DE PUBLICATION			Page Numbers in original / Numéros des pages dans l'original
Not given	Year / Année	Volume	Issue No. / Numéro	67-72
Place of Publication / Lieu de publication				Number of typed pages / Nombre de pages dactylographiées
USSR	1967	9	–	9

Requesting Department / Ministère-Client: DFO

Translation Bureau No. / Notre dossier nº: 2126537

Branch or Division / Direction ou Division: SIPB

Translation (Initials) / Traducteur (initiales): WDP

Person requesting / Demandé par: A.T. Reid/Ottawa, Ont.
A. Oxley/Halifax, N.S.

Your Number / Votre dossier nº: –

Date of Request / Date de la demande: 14 November 1985

UNEDITED TRANSLATION
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TRADUCTION NON REVISEE
Information seulement

SEC 5-111 (81/01)

Secretary of State / Secrétariat d'État

MULTILINGUAL SERVICES DIVISION – DIVISION DES SERVICES MULTILINGUES

TRANSLATION BUREAU / BUREAU DES TRADUCTIONS

Client's No.—N° du client	Department – Ministère	Division/Branch – Division/Direction	City – Ville
–	DFO	SIPB	Halifax
Bureau No.—N° du bureau	**Language – Langue**	**Translator (Initials) – Traducteur (Initiales)**	
2126537	Russian	WDP	JAN - 9 1986

Materialy ryb. khoz. issled. sev. basseina (Fisheries Research Papers, Northern Basin), Vol. 9, 1967, pp. 67-72 (USSR)

Data on Seal Distributions in the Greenland Sea Depending on the Position of the Ice Edge

O. Ch. Mikhnevich and V.A. Potelov,
Marine Mammal Laboratory

Both harp (Greenland) and hooded seals are typical pagophiles. /67*
They need a hard substrate in the form of ice for rest, parturition, nursing their young, and moulting. Observations have shown that seals in both their postpartum** (hooded and harp seals) and moulting (harp seals) periods lie on ice of different origin, thickness and density. Seals adapt to whatever the ice conditions may be in a given year, and neither the shape of the ice nor its thickness or origin are of any decisive importance to the animals' biological functions. Nonetheless hooded seals prefer small floes of Arctic or local origin, while harp seals are drawn more to ice fields or small floes of local origin.

Translator's notes:

*Numbers in the right-hand margin indicate the corresponding pages in the original.

**"Postpartum" is one equivalent of the original Russian adjective shchennyi, related to the noun shchenok, meaning "puppy", "cub" or "whelp". A suggested alternative to "postpartum" is therefore "whelping".

During the postpartum period both species avoid ice close to the edge and washed by waves.

S.S. Surkov (3), R.Sh. Khuzin and M.Ya. Yakovenko (4) consider that the open pack ice on the boundary of the East Greenland Current and in the stream of the Jan Mayen current best favour the nursing of pups; ice of this kind facilitates the approach of pregnant females and helps the pups move (by the time they convert to independent feeding) into the ice breakup zone, where they descend into the water. The results of analysis of our material for the most part confirm these assumptions, which were made earlier. Thus, regardless of the prevalence of ice in a given year, accumulations of seals occur in open pack ice in the southeastern part of the ice pack (Fig. 2). The discovery of large rookeries in 1961-1962, however, represents a departure from this rule (2). Thus from 16 to 18 March 1962 investigators found a rookery in the region of 71°31'-72°00'N on Arctic ice directly in the stream of the East Greenland Current.

Creary and Rodal [spellings approximate] (1) call the Arctic ocean the "Atlantic Mediterranean Basin", since it has a single deep outlet through the Greenland Sea into the North Atlantic, and the main water exchange between the two basins takes place through this sea. Under the action of winds and currents the vast ice fields move from northern regions through the Greenland Sea into more southerly areas. The ice, as it drifts, is broken up by winds and currents, melts somewhat in summer, freezes over even more in winter, and, as so-called pack ice, penetrates from the Arctic Ocean into the Greenland Sea and partly the Barents Sea. The ice thickness reaches 7 to 9 metres. Ice floes as much as 2 or 3 metres thick, but rarely more than 100 m long,

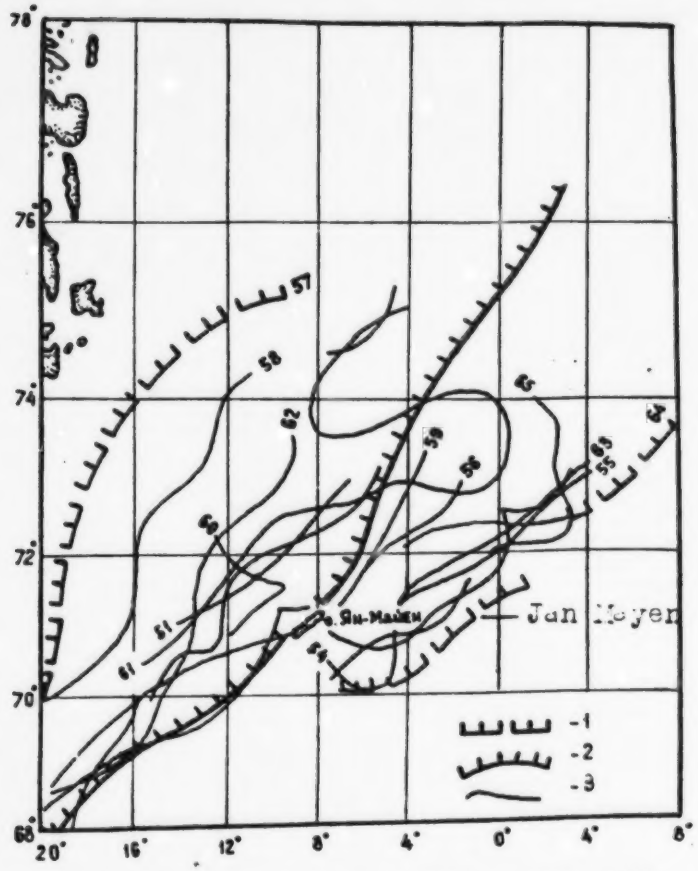

Рис. 1. Положение кромки льдов во второй половине марта в Гренландском море:

1 — крайние положения кромок с 1951 по 1965 год. *2* — среднестатистическое положение кромки льдов (по лоции). *3* — положение кромки и год исследования

Fig. 1. The position of the ice edge in the Greenland Sea in the second half of March:
1 - farthest positions of edges from 1951 to 1965 inclusive; 2 - mean statistical position of ice edge (from navigational directions); 3 - position of edge and year of research.

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however, occur in regions where seals accumulate. By the time (March) the seals begin to approach their favourite regions, here the pack ice is supplemented by ice originating locally: newly formed and pancake ice, however, small and very light floes and so on. /68

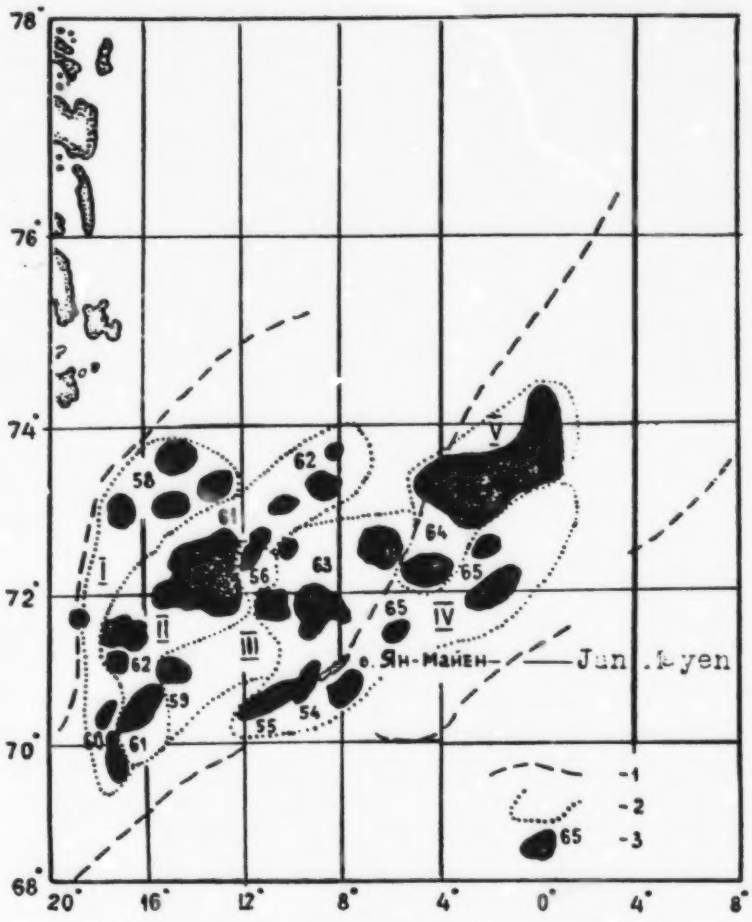

Рис. 2. Распределение залежек хохлача в Гренландском море:
1 — крайние и средние положения кромок, *2* — распределение залежек хохлача в зависимости от положения кромки льда, *3* — залежка хохлача и год ее обнаружения

Fig. 2. Distribution of hooded seal rookeries in the Greenland Sea: 1 - extreme and average positions of edges; 2 - distribution of hooded seal rookeries in relation to position of ice edge. 3 - hooded seal rookery and year of discovery.

The strong East Greenland Current promotes the formation along the entire east coast of Greenland of an ice belt from 60 to 500 miles wide in the Greenland-Jan Mayen region; the width of the ice depends mainly on the weather conditions and the ice circulation in the western Arctic Ocean affecting the amount of ice discharged into the Greenland

Sea. The prevailing winds are the weather factor most affecting the ice conditions near Jan Mayen Island. Usually east winds move the ice edge away to the west of Jan Mayen Island, while northwest winds move it towards the east.

Fig. 1 gives the contours of the ice edges from 1951 to 1965, from which we see how variable ice conditions are in the Greenland Sea in different years. The recorded position of the ice, however, applies only to a specific date. Even slight changes in the weather are enough /69 to shift these boundaries in any direction.

Table 1

Distance of Ice Edges from the Greenland Coast by Years

Minimum	Average	Maximum
1957	1956	1954
1958	1959	1955
1960	-	1963
-	-	1965

This situation makes it somewhat difficult to establish seal distribution patterns. From all the variations in the position of the ice edges in the second half of March we can select without major error /71 only 3 from which we can compare seal distribution as related to sea ice prevalence:

a) the minimum distance from the Greenland coast (1957);

b) the maximum such distance (1964);

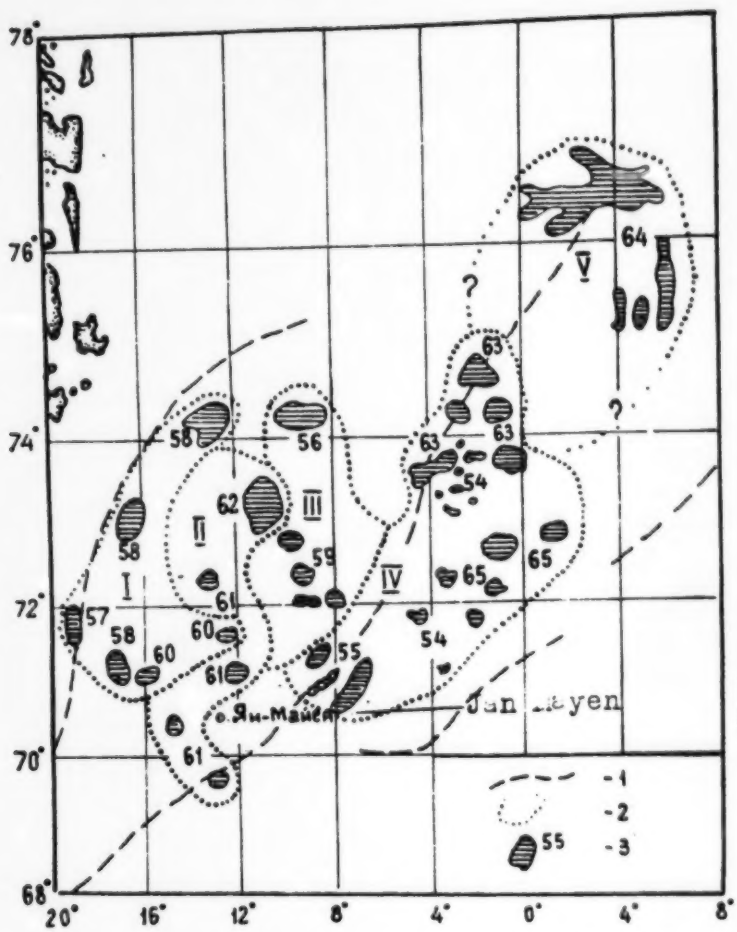

Рис. 3. Распределение щенных залежек гренландского тюленя в Гренландском море:

1 — крайние и средние положения кромок; *2* — распределение залежек в зависи

Fig. 3. Distribution of harp (Greenland) seal whelping [postpartum] rookeries in the Greenland Sea; 1 - extreme and average positions of edges; 2 - distribution of rookeries depending on [remainder of subcaption missing from photocopy] /70

c) the statistical mean for a number of years (from the navigational instructions entitled Grenlandskoe more [The Greenland Sea]);

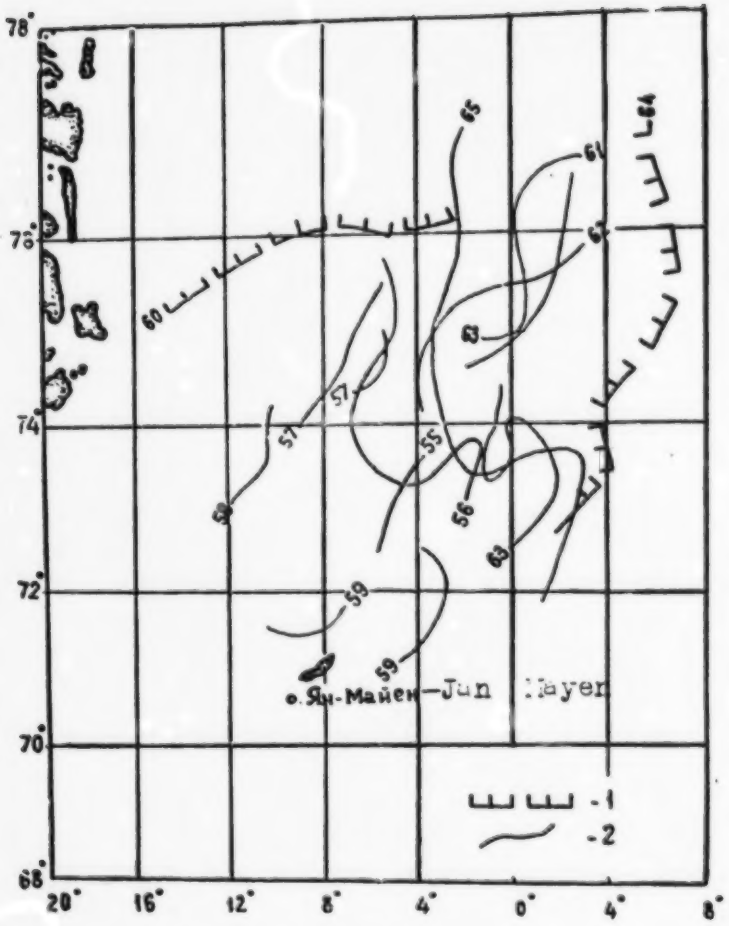

Рис. 4. Положение кромок льда на начало линного периода в Гренландском море:

Fig. 4. Position of ice edges at beginning of moulting period in Greenland Sea: [balance of caption missing]

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d) we can assign the other [ice edge positions] provisionally to those listed in relation to distance from Greenland (Table 1).

We see an exception in the 1961 and 1962 ice boundaries, intermediate between the "minimum" and "average" ice edges, and those of 1964, the year with the heaviest ice of all the sealing seasons, i.e.,

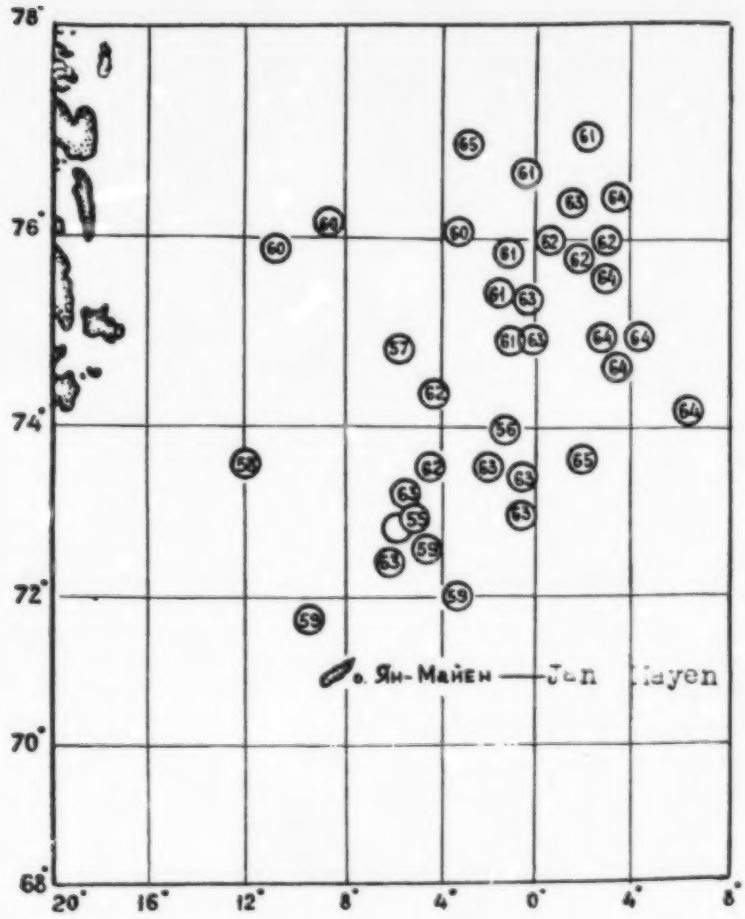

Рис. 5. Распределение линных залежек лысуна в Гренландском море

Fig. 5. Distribution of harp seal moulting rookeries in the Greenland Sea.

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we selected 5 instances of ice edge position in proportion to distance from the Greenland coast. We accordingly segregated five groups of hooded and harp (Greenland) seal accumulations gathering for parturition in the Greenland Sea.

From Figs. 2 and 3 we see clearly why seals choose a particular region for use as a rookery: the distance of the seal stocks from /72 Greenland is directly proportional to the extent of ice cover on the Greenland Sea; moreover this distance runs more in a longitudinal and less in a latitudinal direction.

The rookeries shift in a longitudinal direction when the ice edge is farthest [from the coast]. During these years, hooded and harp (Greenland) seal rookeries occur more often at the latitude of Jan Mayen Island. Under severe ice conditions (1964), however, the seals lie on the ice northeast of the island and at a considerable distance from it.

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